

Appl. N . 09/927,034
Amdt. Dated April 21, 2004
Reply to Notice of Non-Compliant Amendment dated April 15, 2004

AMENDMENTS TO THE CLAIMS

1-7 (canceled)

8. (currently amended) A laminate for high strength, low weight gas enclosure applications ~~such as including~~ aerostats and airships, said laminate comprising:

at least one woven fabric layer with an aggregated strength greater than 10 grams per denier; and

at least a first gas barrier laminated to one face of said fabric layer;

said woven fabric layer comprising ~~one sheet of~~ yarns of high strength manufactured fibers, ~~wherein said yarns have a twist of less than 6 turns per inch, and wherein said woven fabric layer has less than 50% of available crossing points formed.~~

9. (canceled)

10. (currently amended) An airship laminate according to Claim 8 and further comprising a second gas barrier layer laminated to the opposite face of said woven fabric from said first gas barrier layer.

11. (currently amended) An airship laminate according to Claim 10 wherein said first gas barrier layer comprises a single layer of polymeric material and said second gas barrier layer comprises a plurality of polymeric layers.

12. (currently amended) An airship laminate according to Claim 11 wherein said first gas barrier layer comprises polyurethane.

13. (currently amended) An airship laminate according to Claim 12 wherein said second gas barrier layer comprises:

a layer of polyurethane on said fabric;

a layer of polyester film on said polyurethane layer;

another layer of polyurethane on said polyester layer; and

a layer of fluorocarbon polymer on said other polyurethane layer.

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14. (currently amended) An airship laminate according to Claim 8 wherein said woven fabric comprises a basket weave.

15. (currently amended) An airship laminate according to Claim 8 wherein said woven fabric comprises a two by two basket weave.

16. (canceled)

17. (currently amended) An airship laminate according to Claim 8 wherein said woven fabric having has less than 20% of available crossing points formed.

18. (currently amended) An airship laminate according to Claim 8 comprising a plurality of fabric layers wherein each layer consists of at least one sheet of yarns.

19. (canceled)

20. (currently amended) An airship laminate according to Claim 8 wherein said yarns have between about 1 and 6 turns per inch a helix angle consistent with a twist of 6 turns per inch in a 1500 denier yarn.

21-22 (canceled)

23. (currently amended) An airship laminate according to Claim 8 wherein said yarns have a height-to-width aspect ratio of between about 1:2 and 1:7.

24. (currently amended) An airship laminate according to Claim 8 wherein said woven fabric has a yarn to fabric strength ratio of between about 1:36 and 1:8.

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25. (currently amended) An airship laminate according to Claim 8 wherein said yarns in said woven fabric are selected from the group consisting of aromatic polyamide yarns, liquid crystal polyester yarns, and blends thereof.

26 - 40 (canceled)

41. (currently amended) A laminate for high strength, low weight gas enclosure applications including aerostats and airships such as aerostats or airships, said laminate comprising:

at least one woven fabric layer with an aggregated strength greater than 10 grams per denier; and

a first gas barrier layer;

said woven fabric consisting essentially of yarns that have a cross-sectional height-to-width aspect ratio of between 1:2 and 1:7, and wherein said yarns have a twist of less than about 6 turns per inch.

42. (currently amended) An airship laminate according to Claim 41 wherein said yarns have a helix angle consistent with a twist of between about 1 and 6 turns per inch in a 1500 denier yarn.

43-44 (canceled)

45. (currently amended) An airship laminate according to Claim 41 wherein said woven fabric has a yarn to fabric strength ratio of between about 1:36 and 1:8.

46. (currently amended) An airship laminate according to Claim 41 and further comprising a second gas barrier layer laminated to the opposite face of said woven fabric from said first gas barrier layer.

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47. (currently amended) An airship laminate according to Claim 46 wherein said first gas barrier layer comprises a single layer of polymeric material and said second gas barrier layer comprises a plurality of polymeric layers.

48. (currently amended) An airship laminate according to Claim 47 wherein said second gas barrier layer comprises:

- a layer of polyurethane on said fabric;
- a layer of polyester film on said polyurethane layer;
- another layer of polyurethane on said polyester layer; and
- a layer of fluorocarbon polymer on said other polyurethane layer.

49. (currently amended) An airship laminate according to Claim 41 wherein said yarns in said woven fabric are selected from the group consisting of aromatic polyamide yarns, liquid crystal polyester yarns, and blends thereof.

50. (currently amended) A laminate for high strength, low weight gas enclosure applications including aerostats and airships such as aerostats or airships, said laminate comprising:

at least one woven fabric layer with an aggregated strength greater than 10 grams per denier; and

- a first gas barrier layer;
- said woven fabric being formed of yarns; said yarns having a height-to-width aspect ratio of between 1:2 and 1:7; and
- said fabric having a yarn-to-fabric strength ratio of between about 1:36 and 1:8.

51. (currently amended) A laminate according to Claim 50 wherein said yarns have a helix angle consistent with a twist of between about 1 and 6 turns per inch in a 1500 denier yarn.

52-54 (canceled)

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55. (original) A laminate according to Claim 50 and further comprising a second gas barrier layer laminated to the opposite face of said woven fabric from said first gas barrier layer.

56. (original) A laminate according to Claim 55 wherein said first gas barrier layer comprises a single layer of polymeric material and said second gas barrier layer comprises a plurality of polymeric layers.

57. (original) A laminate according to Claim 56 wherein said second gas barrier layer comprises:

- a layer of polyurethane on said fabric;
- a layer of polyester film on said polyurethane layer;
- another layer of polyurethane on said polyester layer; and
- a layer of fluorocarbon polymer on said other polyurethane layer.

58. (original) A laminate according to Claim 50 wherein said yarns in said woven fabric are selected from the group consisting of polyamide yarns, polyester yarns, and blends thereof.

59. (currently amended) A laminate for high strength, low weight gas enclosure applications including aerostats and airships such as aerostats or airships, said laminate comprising:

at least one woven fabric layer with an aggregated strength greater than 10 grams per denier; and

a first gas barrier layer;
said woven fabric being formed of twisted yarns; and
said yarns having a twist of no more than 6 twists per inch and a helix angle consistent with a 1500 denier yarn with between 2 and 6 turns per inch.

60. (currently amended) A laminate according to Claim 59 in which said yarns have a ~~helix angle consistent with the helix angle of a 1500 denier yarn that has said twist of between 2 and 6 turns per inch.~~

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61. (original) A laminate according to Claim 59 wherein said yarns have a height-to-width aspect ratio of between 1:2 and 1:7.

62. (original) A laminate according to Claim 59 wherein said woven fabric has a yarn to fabric strength ratio of between 1:36 and 1:8.

63. (original) A laminate according to Claim 59 and further comprising a second gas barrier layer laminated to the opposite face of said woven fabric from said first gas barrier layer.

64. (original) A laminate according to Claim 63 wherein said first gas barrier layer comprises a single layer of polymeric material and said second gas barrier layer comprises a plurality of polymeric layers.

65. (original) A laminate according to Claim 64 wherein said second gas barrier layer comprises:

- a layer of polyurethane on said fabric;
- a layer of polyester film on said polyurethane layer;
- another layer of polyurethane on said polyester layer; and
- a layer of fluorocarbon polymer on said other polyurethane layer.

66. (original) A laminate according to Claim 59 wherein said yarns in said woven fabric are selected from the group consisting of polyamide yarns, polyester yarns and blends thereof.

67. (New) An airship laminate for high strength, low weight gas enclosure applications, said laminate comprising:

at least one fabric layer woven from yarns, said fabric layer having an aggregate strength greater than 10 grams per denier; said yarns in said fabric having a twist of between about 1 and 6 turns per inch and a yarn to fabric strength ratio of between about 1:36 and 1:8; said fabric having a number of crossing points among the woven yarns, with the number of said crossing points being less than half of the number of crossing points that the same number of yarns would form in a plain weave; and

a gas barrier material laminated to said fabric layer.

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68. (New) An airship laminate according to Claim 67, wherein said yarns have a helix angle consistent with a twist of 6 turns per inch in a 1500 denier yarn.

69. (New) An airship laminate according to Claim 67, wherein said yarns have a helix angle consistent with a twist of 4 turns per inch in a 1500 denier yarn.

70. (New) An airship laminate according to Claim 67 wherein said yarns have a helix angle consistent with a twist of 2 turns per inch in a 1500 denier yarn.

71. (New) An airship laminate according to Claim 67 wherein said gas barrier comprises: a first layer of polyurethane on one face of said woven fabric layer; and a second gas barrier layer on the opposite face of said woven fabric, said second gas barrier layer comprising,

a layer of polyurethane on said fabric;
a layer of polyester film on said polyurethane layer;
another layer of polyurethane on said polyester layer; and
a layer of fluorocarbon polymer on said other polyurethane layer.

72. (New) An airship laminate according to Claim 67 wherein said yarns in said woven fabric are selected from the group consisting of aromatic polyamide yarns, liquid crystal polyester yarns, and blends thereof.

73. (New) An airship laminate according to Claim 67 and further comprising a second gas barrier layer laminated to the opposite face of said woven fabric from said first gas barrier layer.

74. (New) An airship laminate according to Claim 73 wherein said first gas barrier layer comprises a single layer of polymeric material and said second gas barrier layer comprises a plurality of polymeric layers.

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75. (New) An airship laminate according to Claim 74 wherein said first gas barrier layer comprises polyurethane.

76. (New) An airship laminate according to Claim 67 wherein said woven fabric comprises a basket weave.

77. (New) An airship laminate according to Claim 67 wherein said woven fabric comprises at two by two basket weave.

78. (New) An airship laminate according to Claim 67 wherein said woven fabric having less than 20% of available crossing points formed.

79. (New) An airship laminate according to Claim 67 comprising a plurality of fabric layers wherein each layer consists of at least one sheet of yarns.

80. (New) An airship laminate according to Claim 79 wherein said fabric layers are different from one another.

81. (New) An airship laminate according to Claim 67 wherein said yarns have a height-to-width aspect ratio of between 1:2 and 1:7.